Indiana Department of Education
Indiana Academic Standards Course Framework

NETWORKING FUNDAMENTALS

Networking Fundamentals introduces students to concepts of local and wide area networks, home networking, networking standards using the IEEE/OSI Model, network protocols, transmission media and network architecture/topologies. Security and data integrity will be introduced and emphasized throughout this course. The purpose of this course is to offer students the critical information needed to successfully move into a role as an IT professional supporting networked computers. Concepts covered will include TCP/IP client administration, planning a network topology, configuring the TCP/IP protocol, managing network clients, configuring routers and hubs as well as creating a wireless LAN.

- DOE Code: 5234
- Recommended Grade Level: Grade 11-12
- Recommended Prerequisites: Computer Tech Support
- Credits: 1-3 credits per semester, maximum of 6 credits
- Counts as a Directed Elective or Elective for the General, Core 40, Core 40 with Academic Honors and Core 40 with Technical Honors diplomas
- This course is aligned with postsecondary courses for Dual Credit:
    - Ivy Tech
        - CINT 108 Linux Fundamentals
        - CINT 121 Network Fundamentals
    - Vincennes University
        - COMP 130 Communications and Networking
        - COMP 230 Advanced Communications and Networking

Dual Credit
This course provides the opportunity for dual credit for students who meet postsecondary requirements for earning dual credit and successfully complete the dual credit requirements of this course.

Application of Content and Multiple Hour Offerings
Intensive laboratory applications are a component of this course and may be either school based or work based or a combination of the two. Work-based learning experiences should be in a closely related industry setting. Instructors shall have a standards-based training plan for students participating in work-based learning experiences. When a course is offered for multiple hours per semester, the amount of laboratory application or work-based learning needs to be increased proportionally.

Career and Technical Student Organizations (CTSOs)
Career and Technical Student Organizations are considered a powerful instructional tool when integrated into Career and Technical Education programs. They enhance the knowledge and skills students learn in a course by allowing a student to participate in a unique program of career and leadership development. Students should be encouraged to participate in Business Professional of America, DECA, or Future Business Leaders of America, the CTSOs for this area.

Content Standards

Domain 1 – Networking Technologies
Core Standard 1 Students validate network configuration, connectivity, and interoperability for managing successful networks.

Standards

NET-1.1 Select the appropriate TCP/IP utility when given a troubleshooting scenario

NET-1.2 Select the appropriate NIC and network configuration settings when given a network configuration

NET-1.3 Configure the connection for a remote connectivity scenario

NET-1.4 Identify the basic capabilities of server operating systems such as UNIX/Linux, Netware, Windows, and Macintosh

NET-1.5 Identify the basic characteristics of WAN technologies

NET-1.6 Identify the purpose of network services

NET-1.7 Define the function of TCP/UDP ports; Identify well-known ports

NET-1.8 Define the purpose, function and/or use of all the protocols with in the TCP/IP suite

NET-1.9 Differentiate between network protocols in terms of routing, addressing schemes, interoperability, and naming conventions

Domain 2 – Network Media and Topologies

Core Standard 2 Students apply and adapt appropriate network media and topologies to maintain a functional network.

Standards

NET-2.1 Identify the cause of the problem when given a network-troubleshooting scenario involving a wiring/infrastructure problem and its location in relation to the ISO layers

NET-2.2 Identify the network area effected and the cause of the problem for a troubleshooting scenario involving a network with a particular physical topology and including a network diagram

NET-2.3 Identify the cause of the failure in troubleshooting scenario involving a small office/home office network failure

NET-2.4 Select the appropriate NIC and network configuration settings when given a network configuration

NET-2.5 Identify the differences between public vs. private networks

NET-2.6 Choose the appropriate media type and connectors to add a client to an existing network

NET-2.7 Recognize and identify media connectors and components of wiring distribution systems including description of their uses

NET-2.8 Specify the characteristics of the various networking media types

NET-2.9 Specify the main features of 802.3 (Ethernet), 802.11a/b/g/n (wireless), and FDDI networking technologies

NET-2.10 Compare and contrast different wireless standards. 802.11 a/b/g/n MIMO, Channel bonding, Frequency, Latency, Speed and distance

NET-2.11 Categorize WAN technology types and properties

Domain 3 – Network Devices

Core Standard 3 Students integrate devices into networks to effect network communications.

Standards

NET-3.1 Determine the nature of the problem for a network scenario when given visual indicators

NET-3.2 Identify the main characteristics of network attached storage

NET-3.3 Identify the basic capabilities of client workstations

NET-3.4 Identify the purpose of sub-netting and default gateways

NET-3.5 Identify IP addresses (Ipv4, Ipv6) and their default subnet masks

NET-3.6 Identify the purpose, features and functions of network components

NET-3.7 Recognize logical or physical network topologies given a schematic diagram or description

Domain 4 – Network Security

Core Standard 4 Students Integrate security in the design and management of networks.

Standards

NET-4.1 Identify the purpose and characteristics of disaster recovery

NET-4.2 Identify security protocols and describe their purpose and function

NET-4.3 Define the function of remote access protocols and services

NET-4.4 Given a scenario, implement appropriate wireless security measures

NET-4.5 Explain the methods of network access security

NET-4.6 Explain methods of user authentication

NET-4.7 Explain common threats, vulnerabilities, and mitigation techniques

NET-4.8 Given a scenario, install and configure a basic firewall

NET-4.9 Categorize different types of network security appliances and methods

Domain 5 – Network Tools

Core Standard 5 Students validate concepts of networking tools to manage and implement networks.

Standards

NET-5.1 Use the appropriate tool for a given a wiring task

NET-5.2 Identify the purpose, benefits and characteristics of using a proxy

NET-5.3 Predict the impact of a particular security implementation on network functionality when given a wiring task

NET-5.4 Given a scenario, use the appropriate network monitoring resource to analyze traffic

NET-5.5 Describe the purpose of configuration management documentation

NET-5.6 Explain different methods and rationales for network performance optimization

Domain 6 – Network Management

Core Standard 6 Students establish routines and procedures appropriate for network management.

Standards

NET-6.1 Identify the cause of the problem when given a network-troubleshooting scenario involving a client connectivity problem

NET-6.2 Predict the impact of modifying, adding, or removing network serviceson network resources and users

NET-6.3 Configure a client to connect to a server running an identified NOS when given specific parameters

NET-6.4 Identify the cause of the problem when given a troubleshooting scenario involving a remote connectivity problem

NET-6.5 Identify the purpose and characteristics of fault tolerance

NET-6.6 Identify the main characteristics of VLANs

NET-6.7 Identify the seven layers of the OSI model and their functions

NET-6.8 Identify the OSI layers at which networking components operate

NET-6.9 Given a scenario, use appropriate hardware and software tools to troubleshoot connectivity issues

NET-6.10 Given a scenario, use the appropriate network monitoring resource to analyze traffic

NET-6.11 Explain different methods and rationales for network performance optimization

NET-6.12 Describe the purpose of configuration management documentation

Domain 7 – Advanced Network Operating Systems **(not Personal Area Network Operating Systems)**

Core Standard 7 Students manage multiple network operating systems to meet industry demands.

Standards

NET-7.1 Classify System Architectures and apply basic O.S. configurations

NET-7.2 Install Open Source software (ex: Linux) and applications through the use of Package Management

NET-7.3 Complete tasks either via the GUI or the command line as appropriate

NET-7.4 Demonstrate proper use of GNU and Unix Commands, including those involving redirection, filtering and piping

NET-7.5 Manage user and group accounts and administer file permissions and attributes.

NET-7.6 Create basic bash scripts to accomplish given O.S. tasks

NET-7.7 Demonstrate knowledge of devices and how they interact with the system

NET-7.8 Configure devices using O.S. tools and commands

NET-7.9 Demonstrate competency of open source (ex: Linux Filesystems, and Filesystem Hierarchy Standard (FHS) with an emphasis on manipulating a Filesystem)

NET-7.10 Navigate using Help utilities, such as HELP, MAN pages, and INFO